

REMARKS

In response to the Office Action mailed September 12, 2005, Applicants respectfully request reconsideration. To further the prosecution of this Application, Applicants submit the following remarks, have canceled claims and have added new claims. The claims as now presented are believed to be in allowable condition.

Claims 1-38 were pending in this Application. By this Amendment, claims 11-38 have been canceled. Applicants expressly reserve the right to prosecute at least some of the canceled claims and similar claims in one or more related Applications. Claims 39-41 have been added. Accordingly, claims 1-10 and 39-41 are now pending in this Application. Claims 1 and 41 are independent claims.

Rejections under §102 and §103

Claims 1-9 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,866,475 (Yanagida). Claim 10 was rejected under 35 U.S.C. §103(a) as being unpatentable over Yanagida in view of U.S. Patent No. 2,933,412 (Thayer). Claims 6-8 were further rejected under 35 U.S.C. §103(a) as being unpatentable over Yanagida in view of U.S. Patent No. 5,866,475 (Lawler).

Applicants respectfully traverse each of these rejections and request reconsideration. The claims are in allowable condition.

Yanagida discloses a method for forming solder bumps (Title). In Yanagida's description of the related art, Yanagida explains that, in order to form a solder bump, an electrode pad 12 composed of an Al alloy or the like is formed on a silicon substrate 10 by a sputtering method, and then a surface protective layer 11 composed of an insulating film such as polyimide film and silicon nitride film is coated on the substrate 10 (column 1, lines 41-46 and Fig. 7A). Then, an opening is formed in the surface protective layer 11, thereby to form a connecting hole for exposing the electrode pad 12, and a Ball Limiting Metal (BLM) film 14

composed of a barrier metal layer is formed with patterning on the electrode pad 12 thereafter (column 1, lines 46-50). Next, a resist film 18 is formed on the substrate, and is applied with patterning further so as to form an opening portion 16 where the BLM film 14 is exposed (column 1, lines 51-54 and Fig. 7B). Next, a solder film 20 is formed on the substrate by vapor deposition or the like (column 1, lines 55-56 and Fig. 7C). In succession, the resist film 18 is removed by resist peeling and cleaning, and the solder film 20 on the resist film 18 is lifted off at the same time (column 1, lines 56-59). As a result, the solder film 20 remains behind only in the opening portion 16 (column 1, lines 59-61 and Figs. 7B and 7D). Next, the solder film 20 is dissolved by heat treatment, and the solder film 20 located on the BLM film 14 is transformed into ball-shaped solder, thus forming a solder ball bump 22 (column 1, lines 62-65 and Fig. 7E).

Thayer discloses a method of protecting solder-coated articles (Title). In particular, Thayer discloses a method of protecting and preserving solder coatings comprising applying an ester of polyhydric alcohol and a fatty acid and a polyalkylene glycol to an article having a solder coating to be protected (column 1, lines 38-42).

Lawler discloses a die bonding process (Title). In particular, Lawler discloses attaching a die to a substrate using a perform 118 (column 4, lines 45-46 and Fig. 3). The perform 118 is preferably an 80:20 gold:tin solder perform having an exemplary thickness of between 0.5-1.0 mils (column 4, lines 46-48).

Claims 1-10

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."¹ "The identical invention must be shown in as complete detail as is contained in the ... claim."²

¹ *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

² *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 1 patentably distinguishes over the prior art because the prior art does not show the identical invention in as complete detail as is contained in the claim.

Claim 1 is directed to a circuit board processing system which includes a circuit board fabrication stage configured to fabricate a circuit board having a set of circuit board pads. The circuit board processing system further includes a solder fusing stage coupled to the circuit board fabrication stage. The solder fusing stage is configured to (i) apply flux and solder concurrently to the set of circuit board pads, and (ii) activate the flux and melt the solder to form a set of substantially flat solder coatings which is fused to the set of circuit board pads. The circuit board processing system further includes a washing stage coupled to the solder fusing stage, the washing stage being configured to remove contamination from a surface of the circuit board having the circuit board pads and from the set of substantially flat solder coatings which is fused to the set of circuit board pads.

Yanagida does not disclose a circuit board processing system having a solder fusing stage which is configured to activate flux and melt solder to form a set of substantially flat solder coatings which is fused to a set of circuit board pads, as recited in claim 1. Rather, Yanagida discloses a method for forming solder bumps (e.g., see the Title of Yanagida) by forming a solder film 20 by vapor deposition or the like (e.g., see column 1, lines 55-56 and Fig. 7C of Yanagida), removing a resist film 18 by resist peeling and cleaning (e.g., see column 1, lines 56-59 of Yanagida), and dissolving the solder film 20 by heat treatment to transform the solder film 20 which is located on a BLM film 14 into ball-shaped solder, thus forming a solder ball bump 22 (e.g., see column 1, lines 62-65 and Fig. 7E of Yanagida). Clearly, at no time does Yanagida activate any flux and melt any solder to form a set of substantially flat solder coatings which is fused to a set of circuit board pads, as required by claim 1.

For the reasons stated above, claim 1 patentably distinguishes over Yanagida. Accordingly, the rejection of claim 1 under 35 U.S.C. §102(b) must be withdrawn, and claim 1 is in allowable condition.

Because claims 2-10 depend from and further limit claim 1, claims 2-10 are in allowable condition for at least the same reasons. It is noted that claim 10 was rejected under 35 U.S.C. §103(a) as being unpatentable over Yanagida in view of Thayer, and that claims 6-8 were further rejected under 35 U.S.C. §103(a) as being unpatentable over Yanagida in view of Lawler. However, neither Thayer, which discloses a method of protecting solder-coated articles (e.g., see the Title of Thayer) nor Lawler, discloses a die bonding process (e.g., see the Title of Lawler) teaches or suggests how one could modify Yanagida's method for forming solder bumps to include a solder fusing stage which is configured to activate flux and melt solder to form a set of substantially flat solder coatings which is fused to a set of circuit board pads, as in claim 1. Moreover, it is unclear why one would want to modify Yanagida's method for forming solder bumps to include such a solder fusing stage since Yanagida's method forms solder bumps.

Furthermore, it should be understood that the dependent claims recite additional features which further patentably distinguish over the cited prior art. For example, claim 6 recites a system having a solder fusing stage configured to provide an amount of paste on a set of circuit board pads to leave, as a set of substantially flat solder coatings, a solder layer that is substantially 0.5 mils in thickness on the set of circuit board pads. The Office Action contends that Lawler discloses such a feature, but Applicants respectfully disagree. Lawler discloses attaching a die to a substrate using a perform 118 having an exemplary thickness of between 0.5-1.0 mils (column 4, lines 45-48 and Fig. 3). There is no mention of paste (containing flux and solder) which clearly reduces in size. Accordingly, claim 6 patentably distinguishes over the cite prior art.

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Newly Added Claims

Claims 39-41 have been added and are believed to be in allowable condition. Claims 39-40 depend from claim 1. Claim 41 is independent. Support for claims 39-41 is provided within the Specification, for example, on page 2, lines 23-26 and page 17, line 4 through page 18, line 19. No new matter has been added.

Conclusion

In view of the foregoing remarks, this Application should be in condition for allowance. A Notice to this affect is respectfully requested. If the Examiner believes, after this Amendment, that the Application is not in condition for allowance, the Examiner is respectfully requested to call the Applicants Representative at the number below.

Applicants hereby petition for any extension of time which is required to maintain the pendency of this case. If there is a fee occasioned by this Amendment, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50-0901.

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If the enclosed papers or fees are considered incomplete, the Patent Office is respectfully requested to contact the undersigned collect at (508) 366-9600, in Westborough, Massachusetts.

Respectfully submitted,



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